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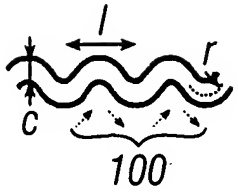


FIG. 1A

FIG. 1B-1

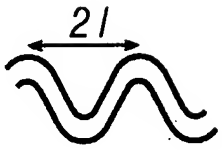


FIG. 1B-2

FIG. 1B-3

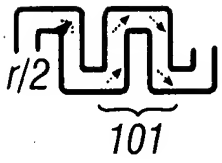


FIG. 1B-4

FIG. 1C-1

FIG. 1C-2

FIG. 1C-3

FIG. 1C-4

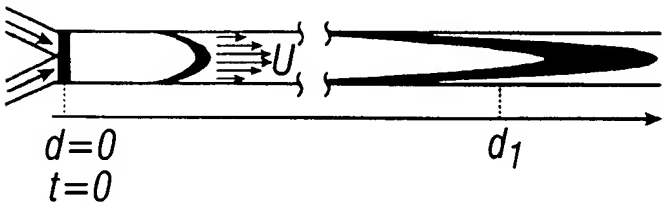


FIG. 2A-1

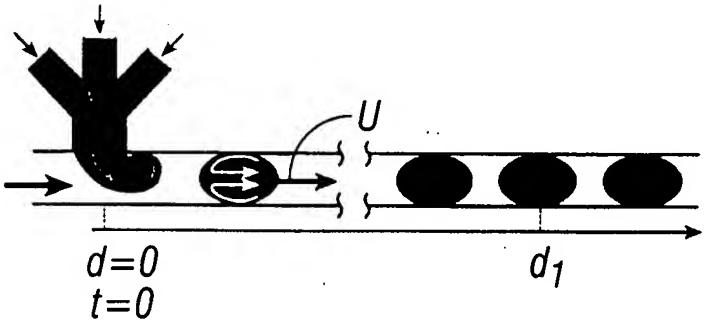


FIG. 2A-2

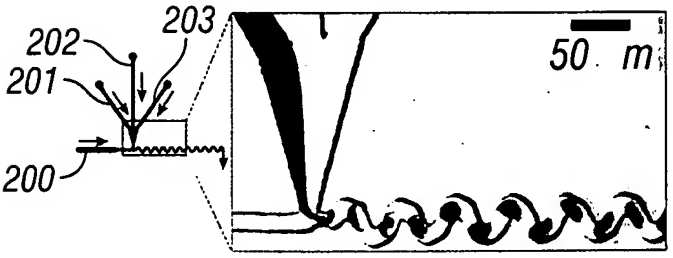


FIG. 2B-1

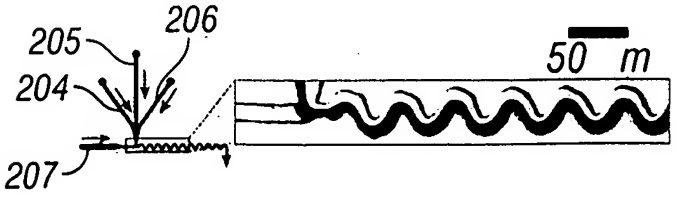
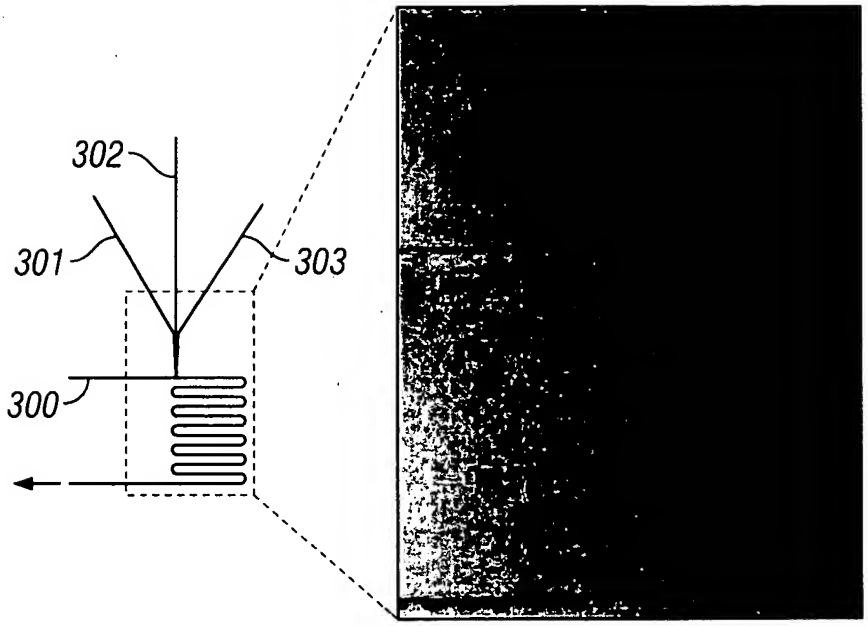


FIG. 2B-2



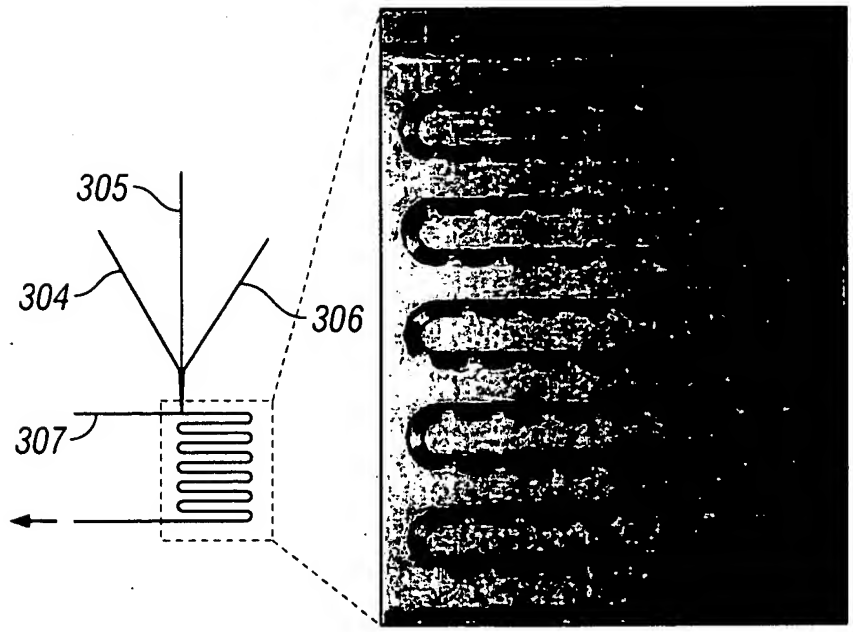


FIG. 3

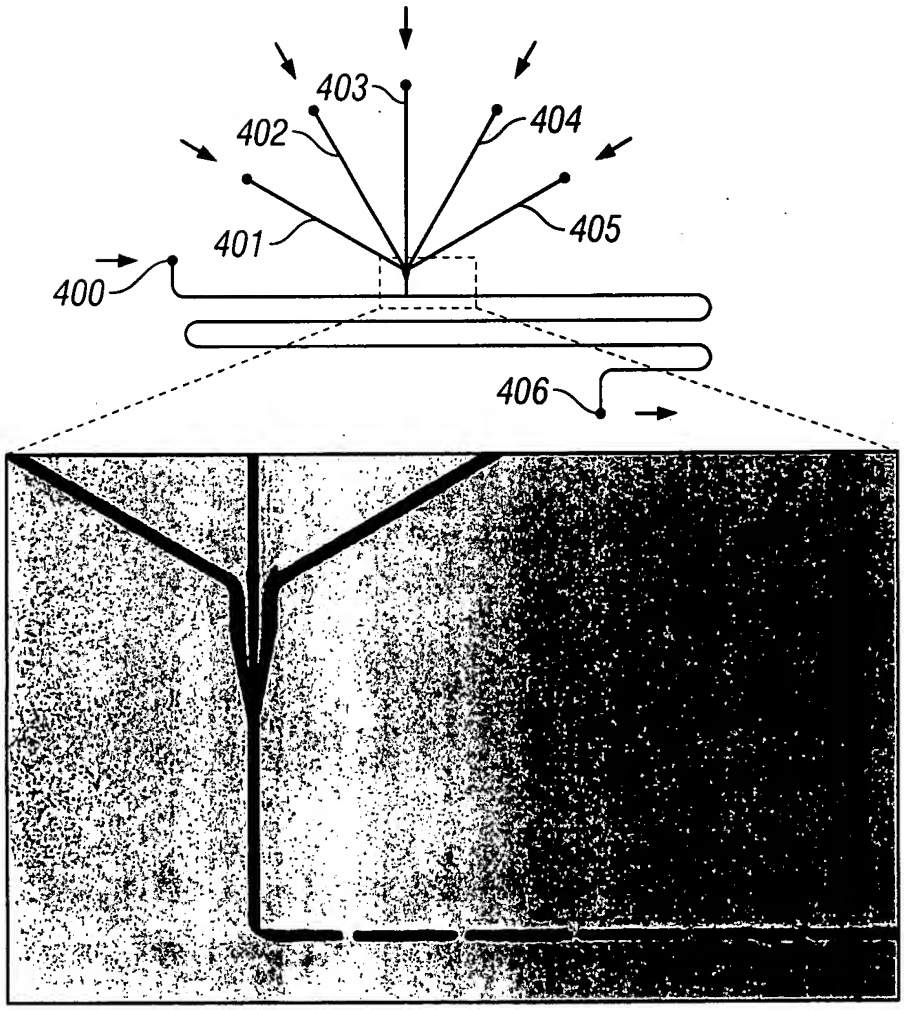


FIG. 4

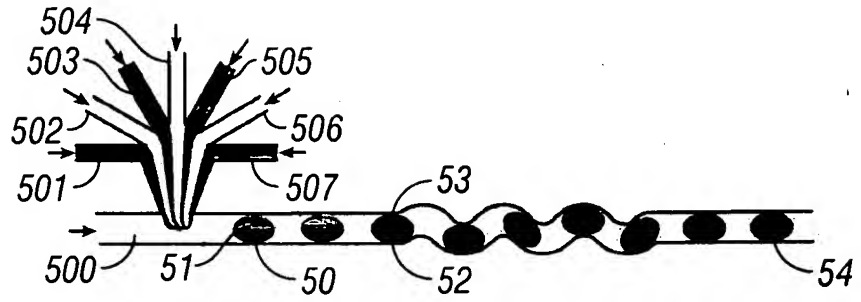

504
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FIG. 5

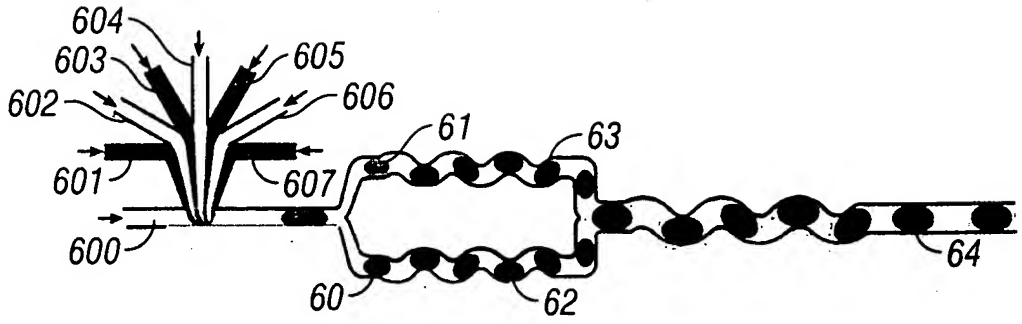
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FIG. 6

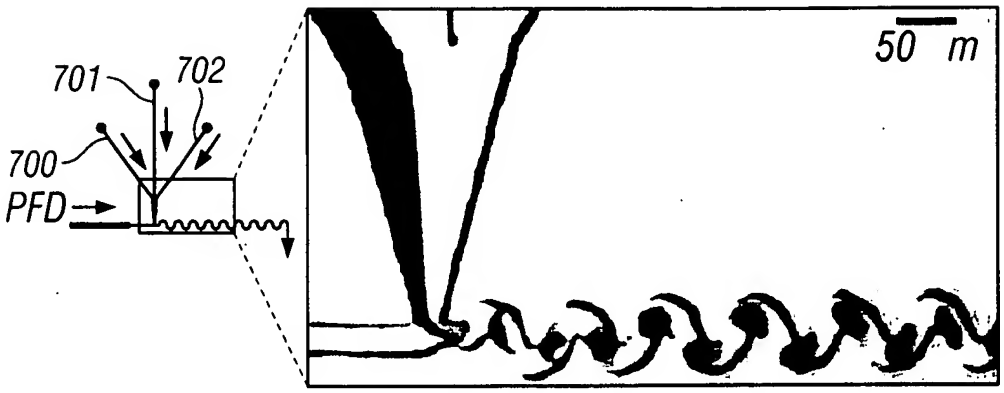

FIG. 7A

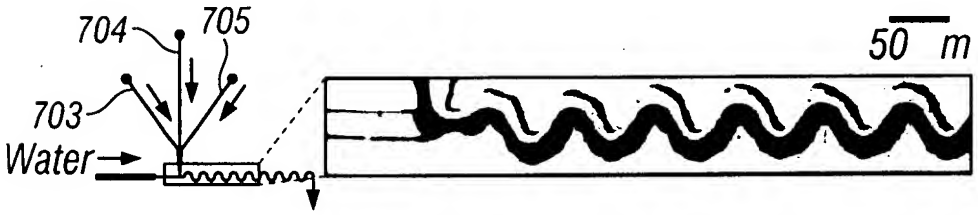

FIG. 7B

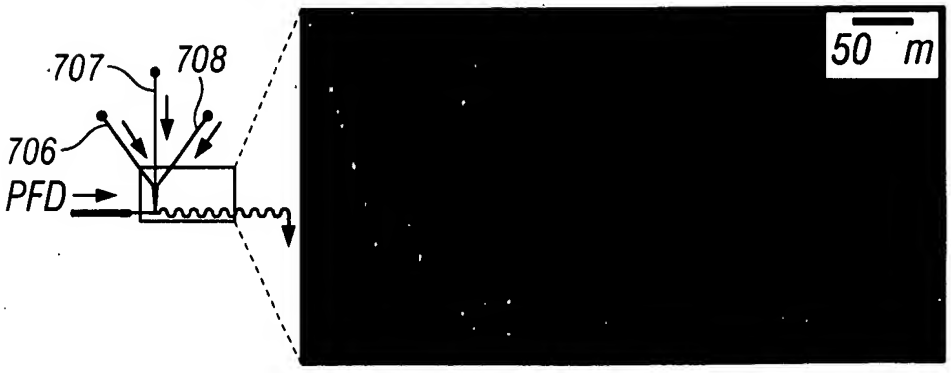

FIG. 7C

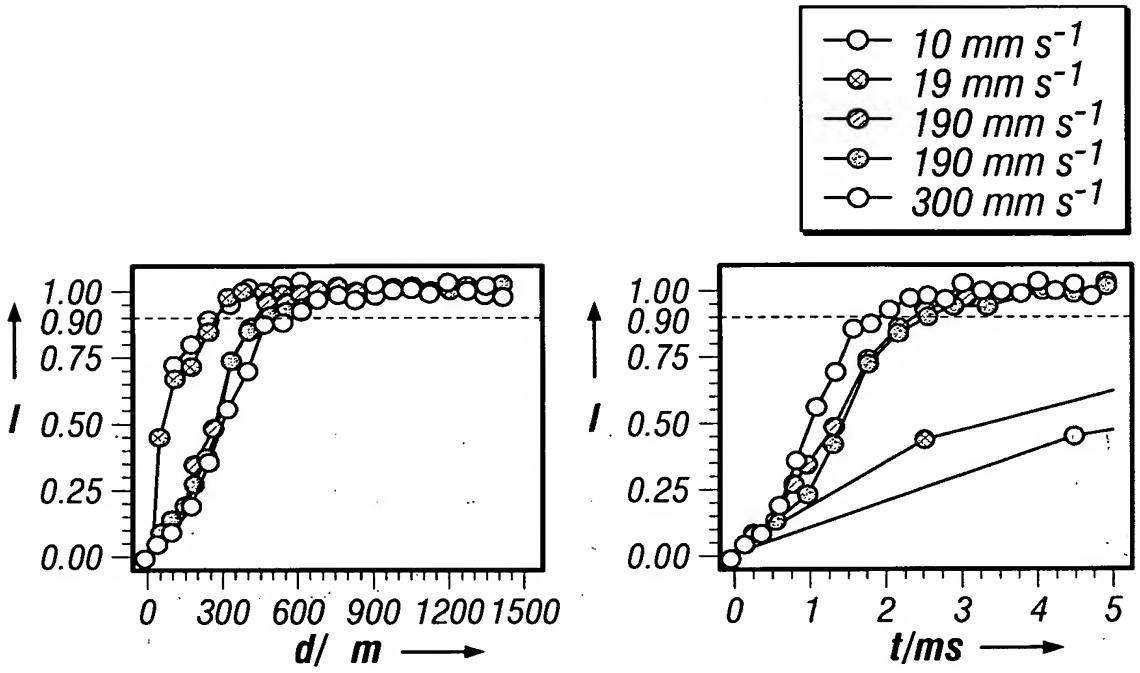
10 mm s-1
19 mm s-1
190 mm s-1
190 mm s-1
300 mm s-1
I
1.00
0.90
0.75
0.50
0.25
0.00
0 300 600 900 1200 1500
d/ m
I
1.00
0.90
0.75
0.50
0.25
0.00
0 1 2 3 4 5
t/ms

FIG. 7D

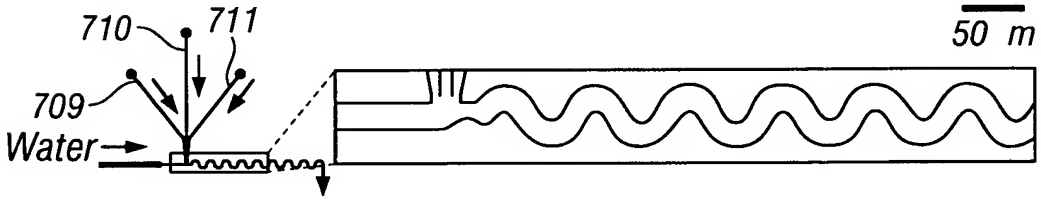
710
711
709
Water
50 m

FIG. 7E

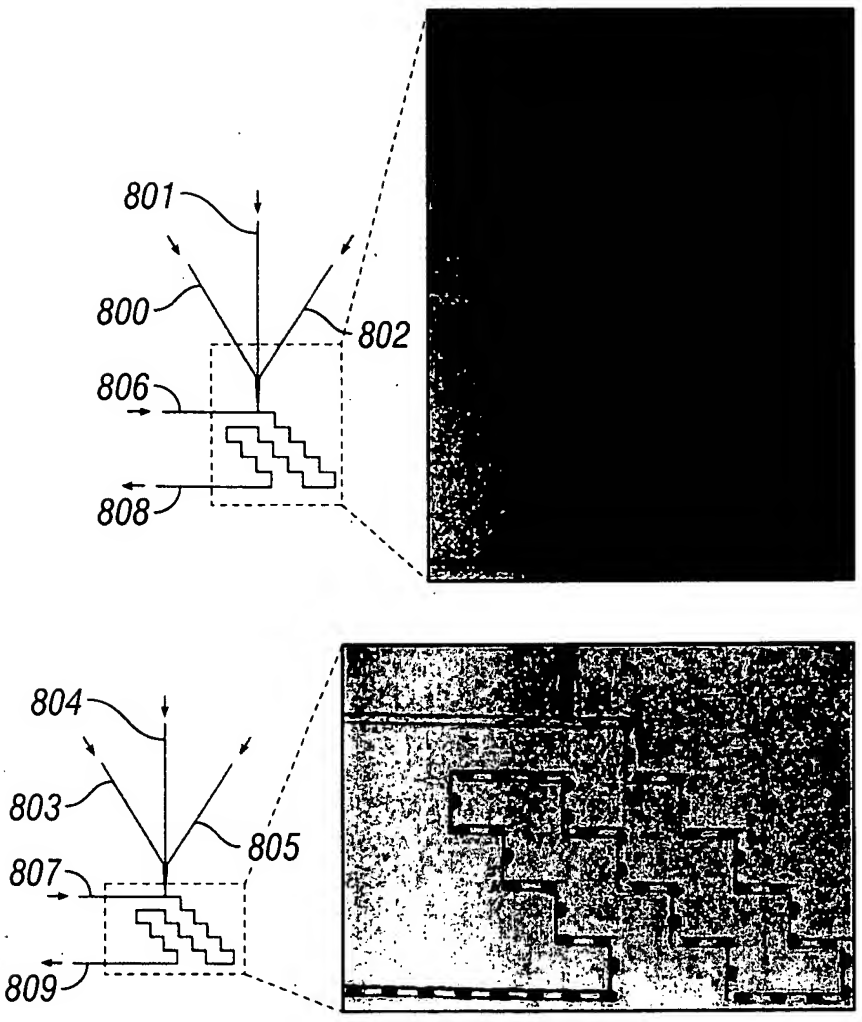

FIG. 8

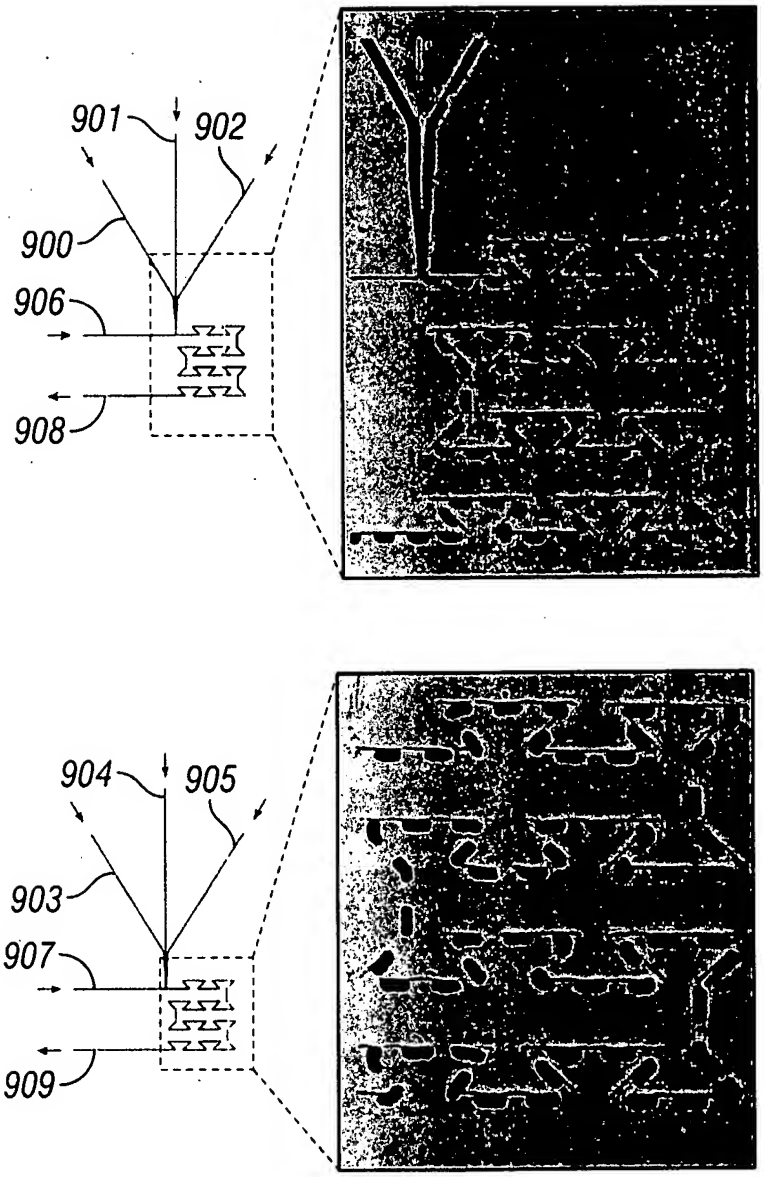

FIG. 9

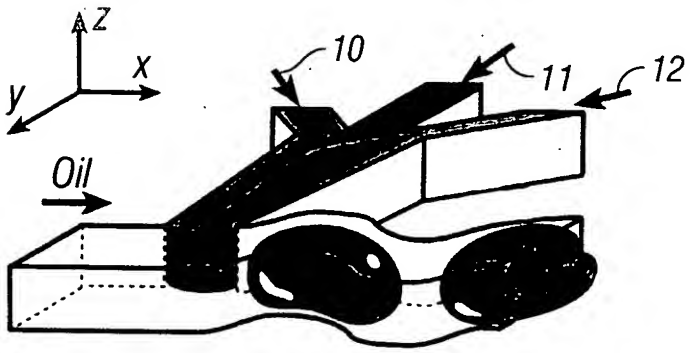

FIG. 10A

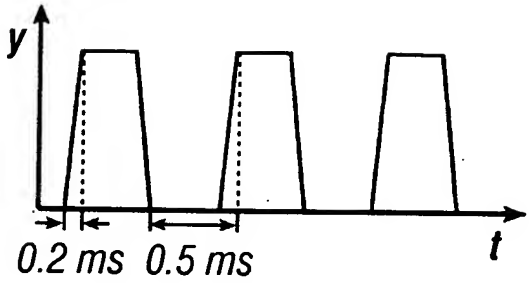

FIG. 10B

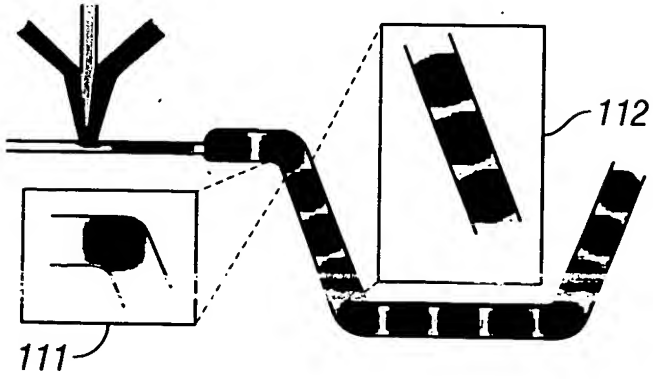

FIG. 11

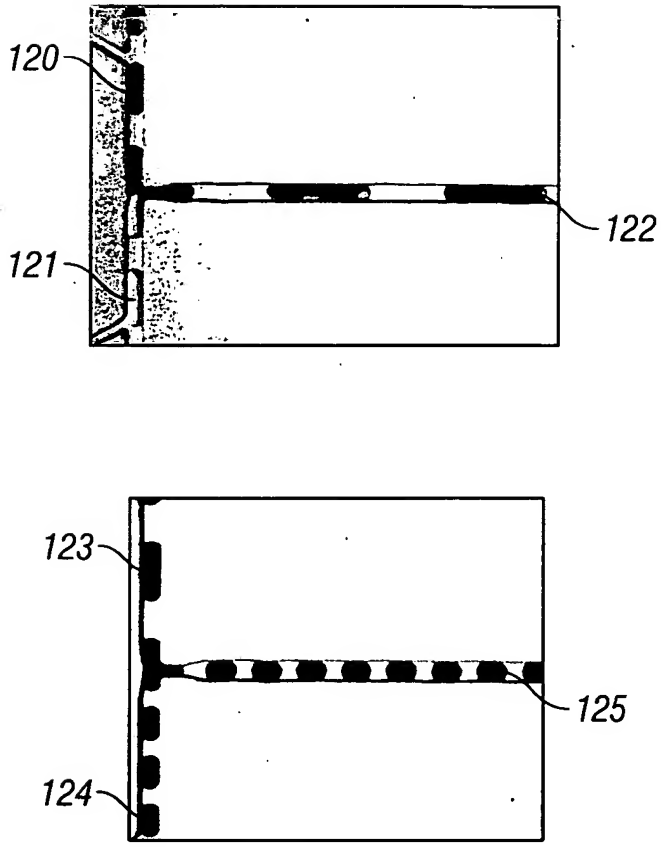
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FIG. 12

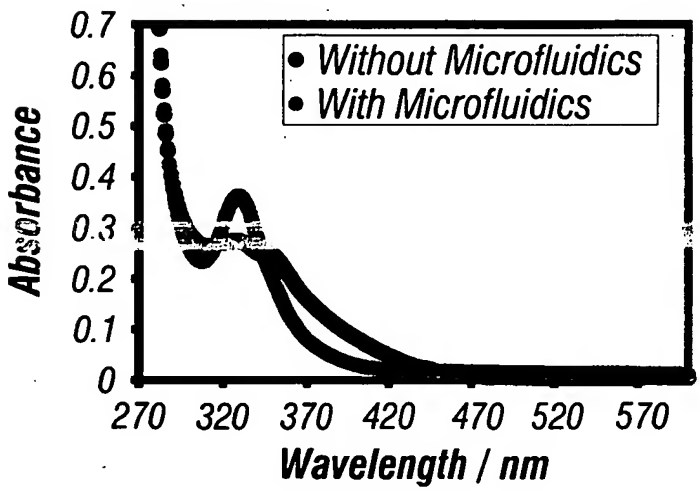

Without Microfluidics
With Microfluidics
Absorbance
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
270
320
370
420
470
520
570
Wavelength / nm

FIG. 13

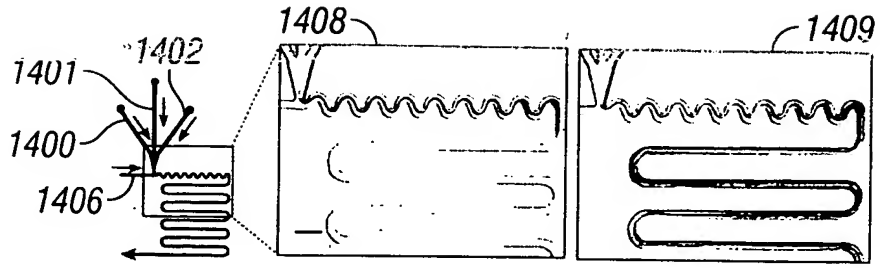


FIG. 14A

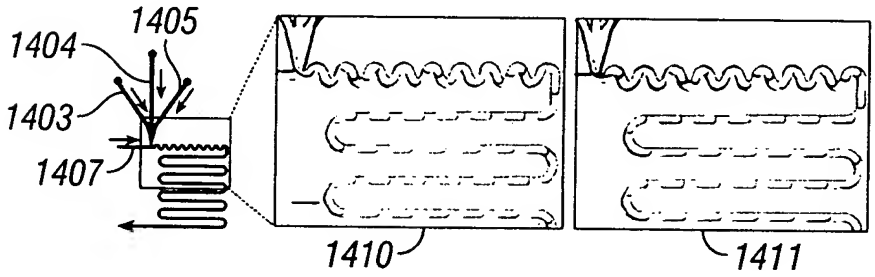


FIG. 14B

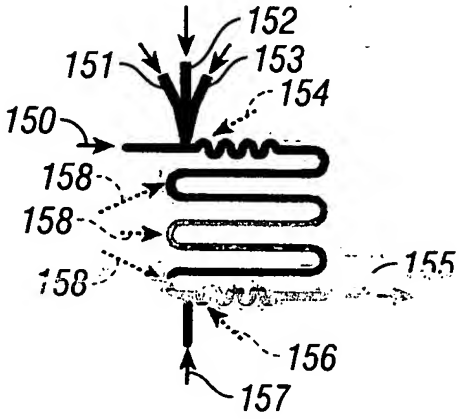


FIG. 15

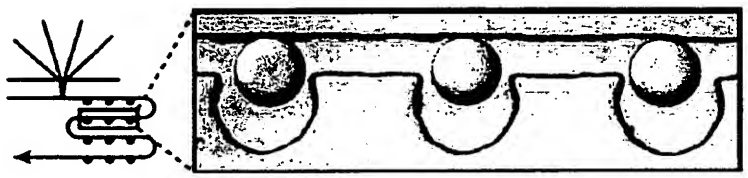


FIG. 16

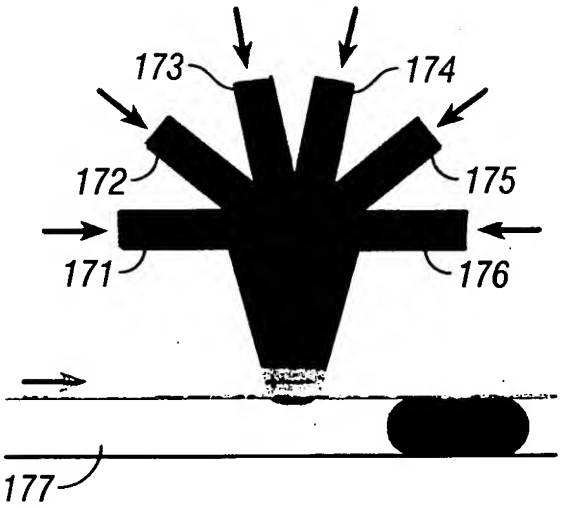
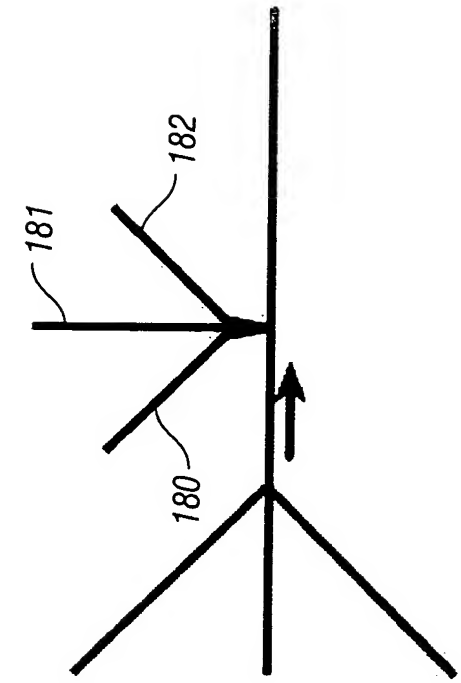


FIG. 17



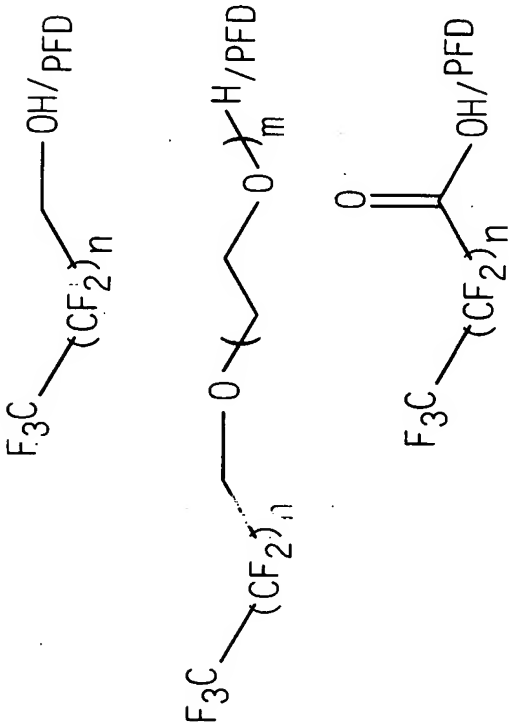


FIG. 18

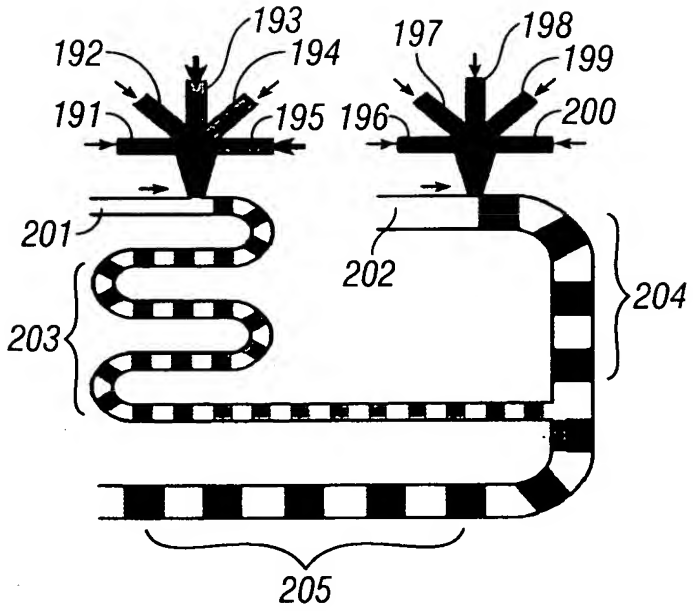


FIG. 19

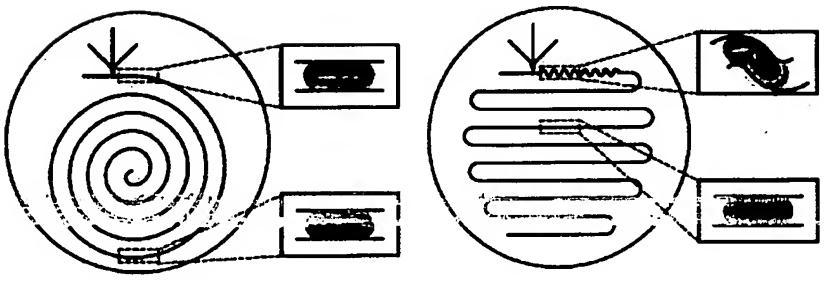


FIG. 20

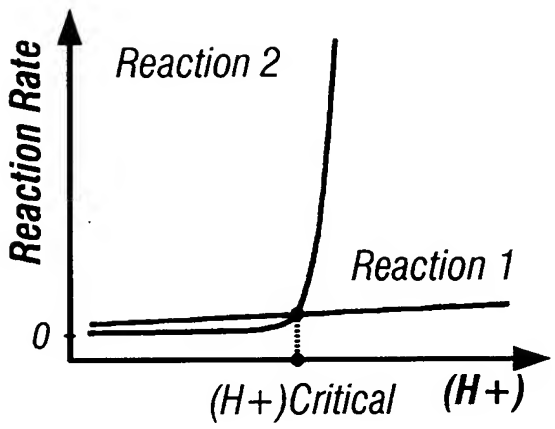


FIG. 21

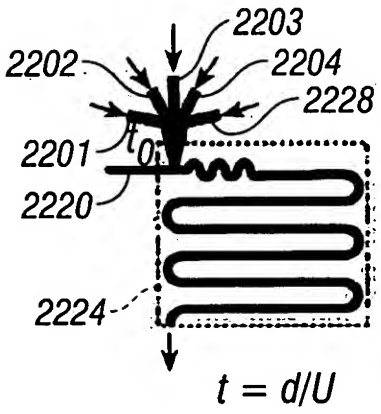
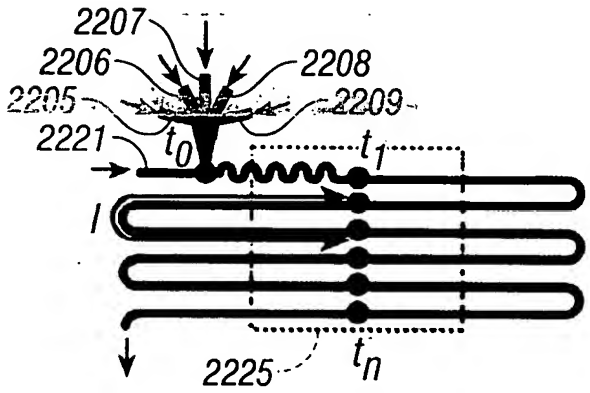
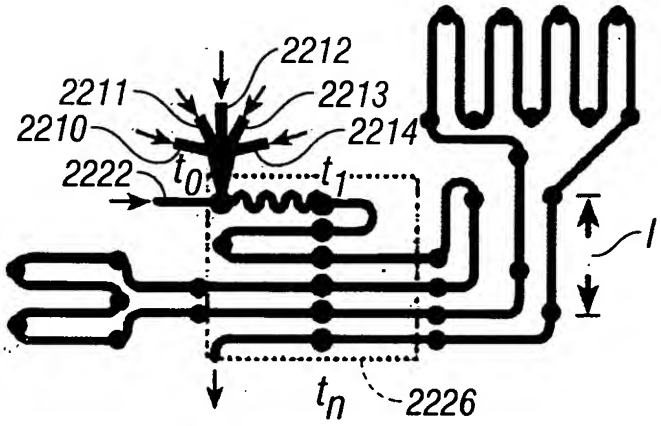


FIG. 22A



$$t_n = (n*l)/U$$

FIG. 22B



$$t_n = (2^{(n-1)}*l)/U$$

FIG. 22C

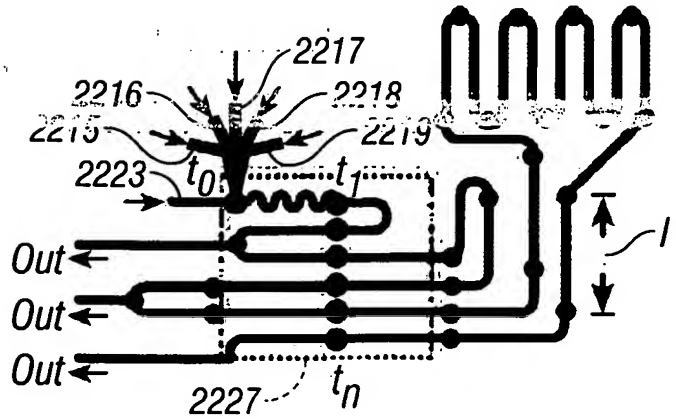


FIG. 22D

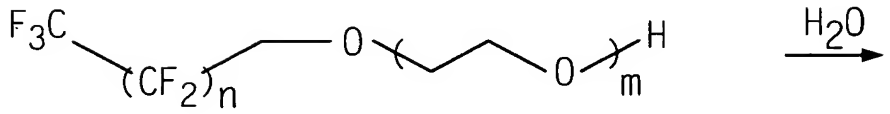


FIG. 24A

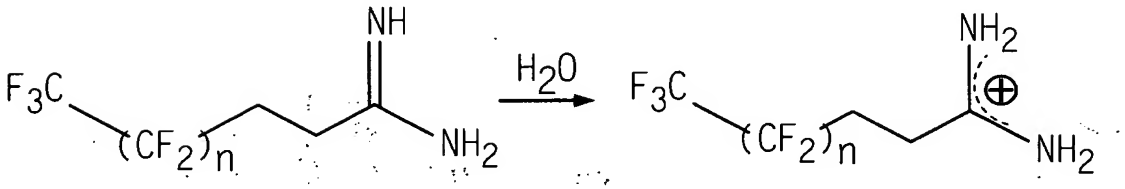


FIG. 24B

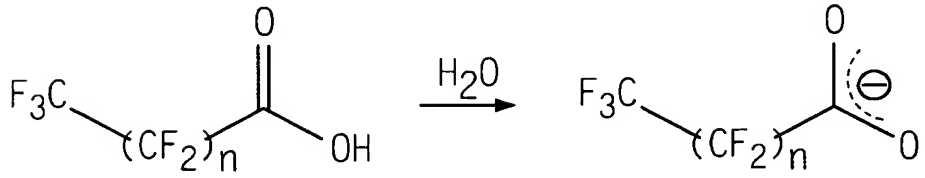


FIG. 24C

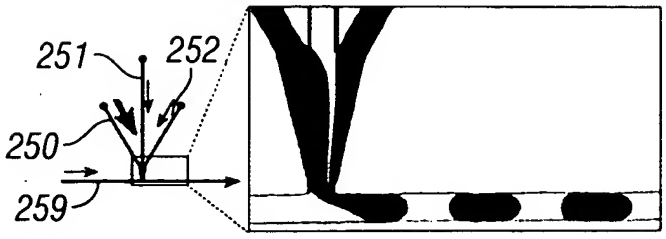


FIG. 25A

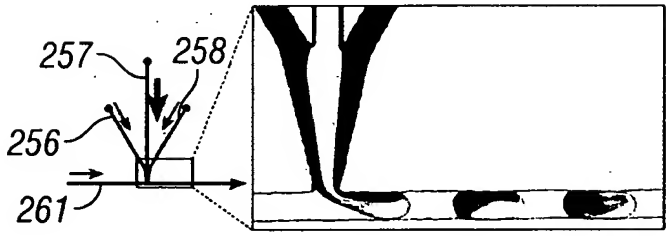


FIG. 25B

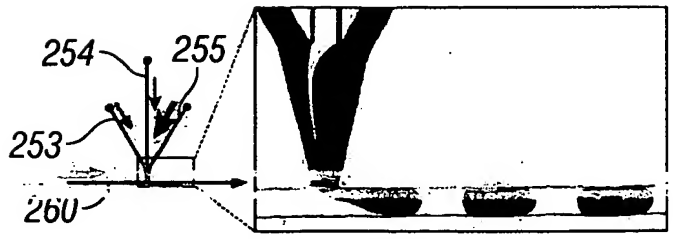


FIG. 25C

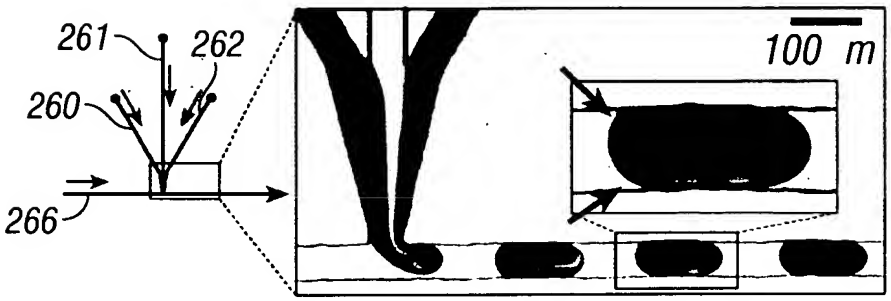


FIG. 26A

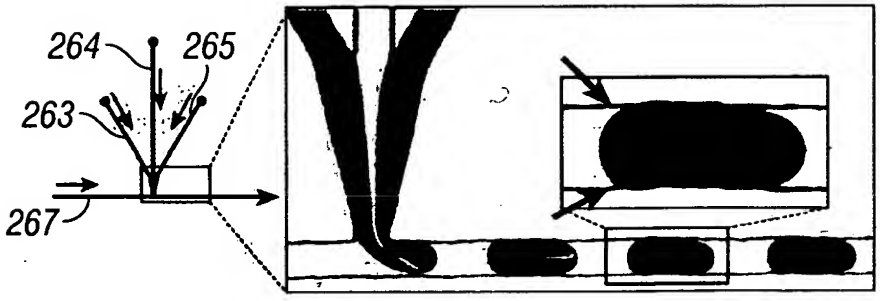


FIG. 26B

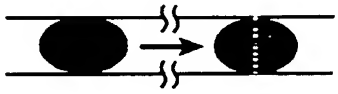


FIG. 27A-1

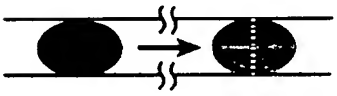


FIG. 27A-2

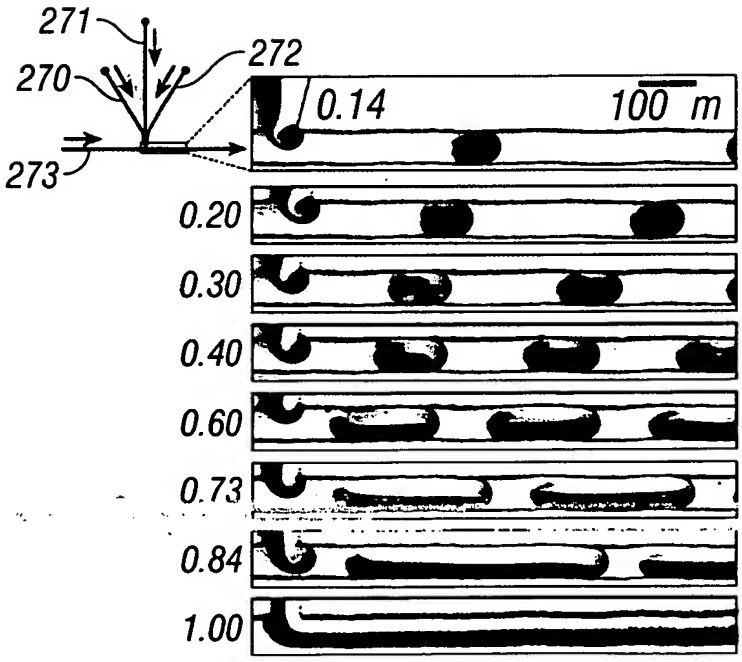


FIG. 27B

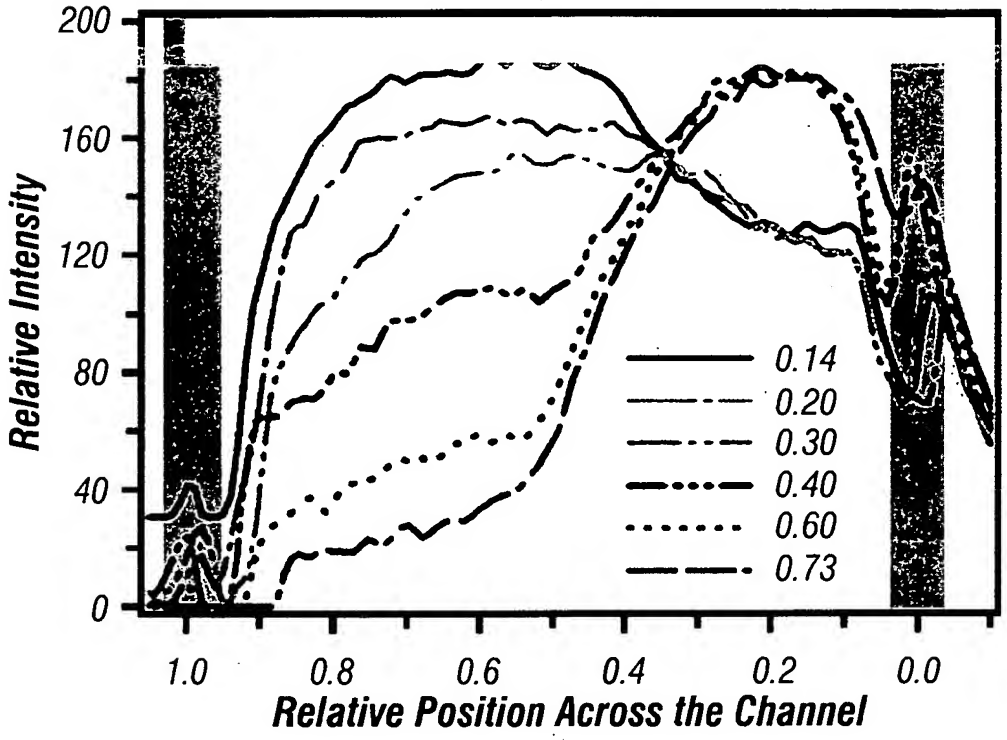


FIG. 27C-1

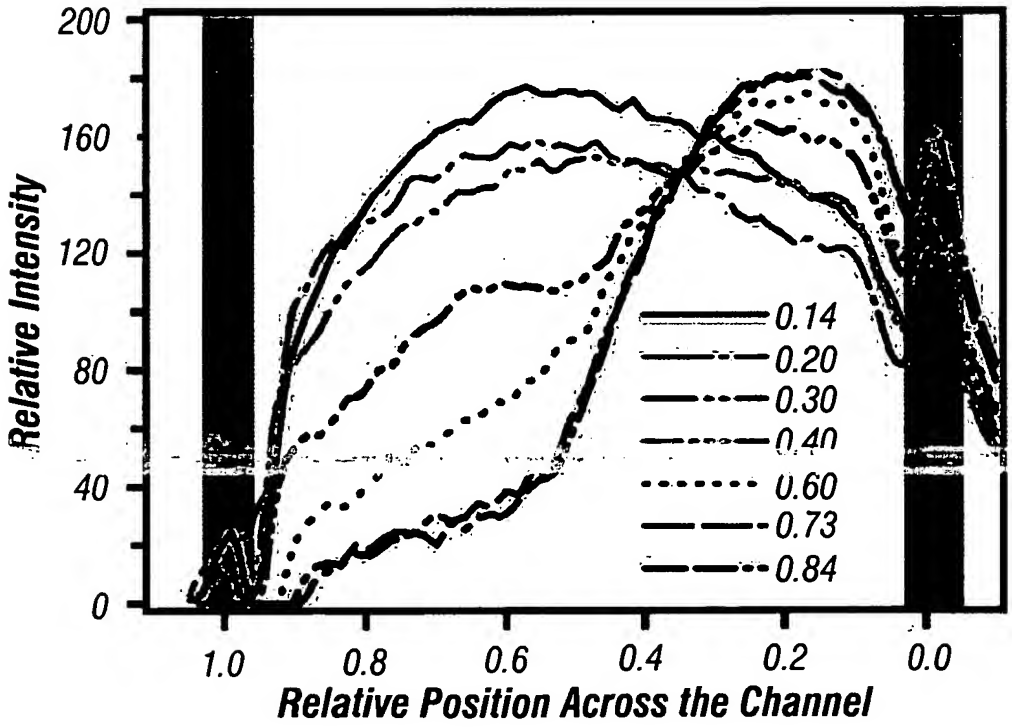


FIG. 27C-2

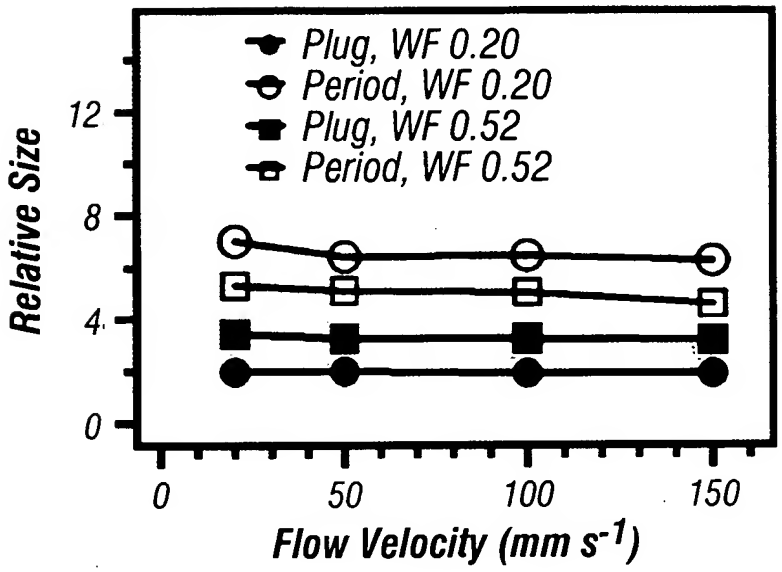


FIG. 29A

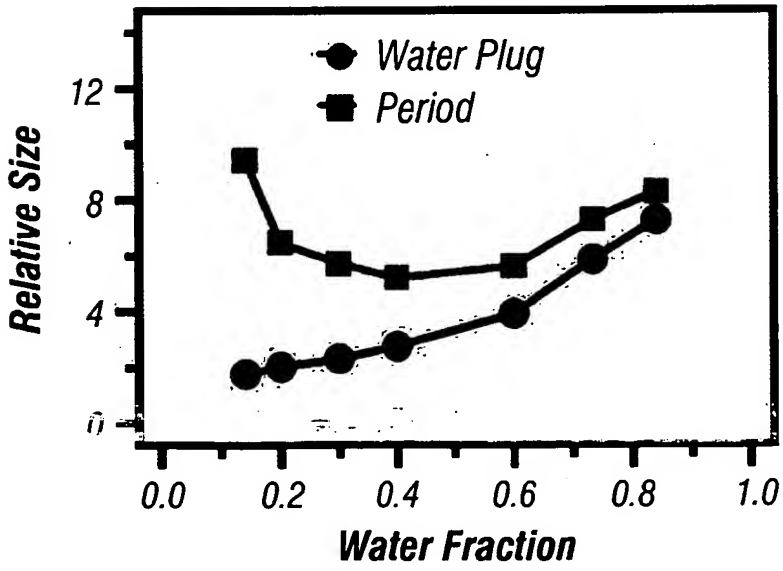


FIG. 29B

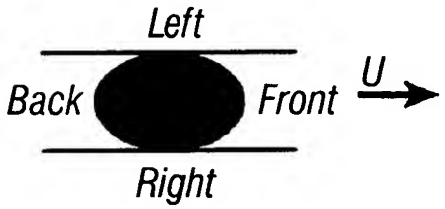


FIG. 28

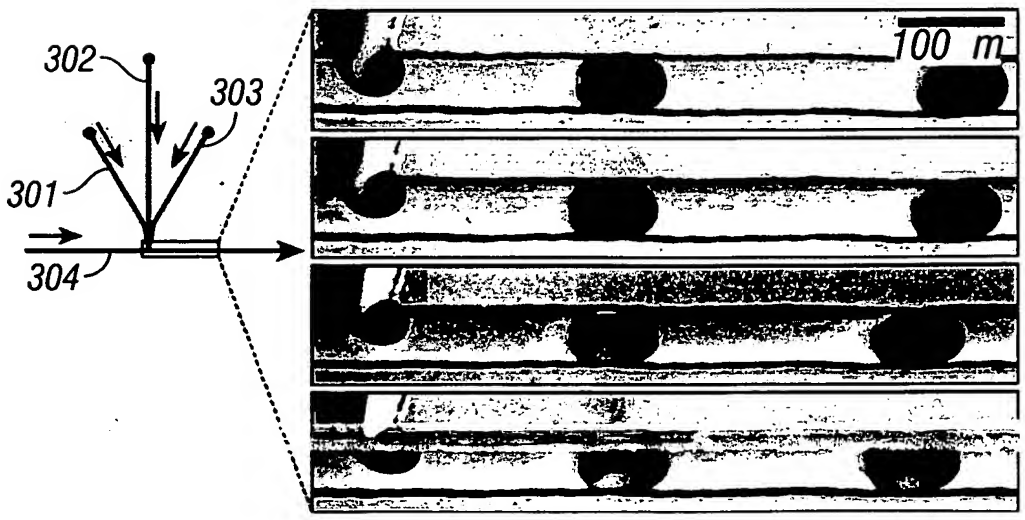


FIG. 30

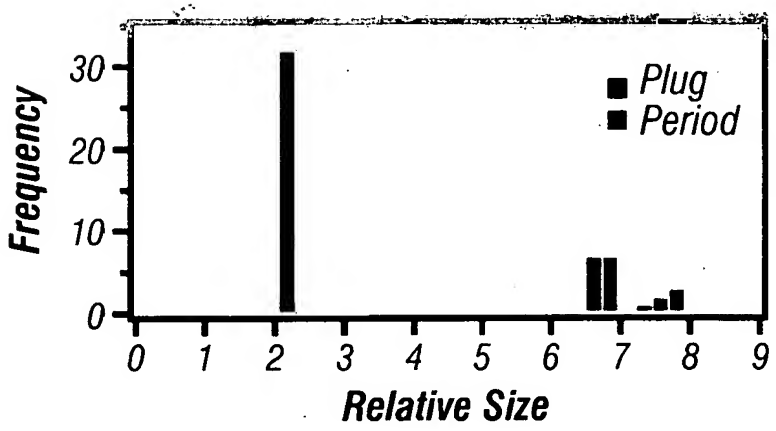


FIG. 31A

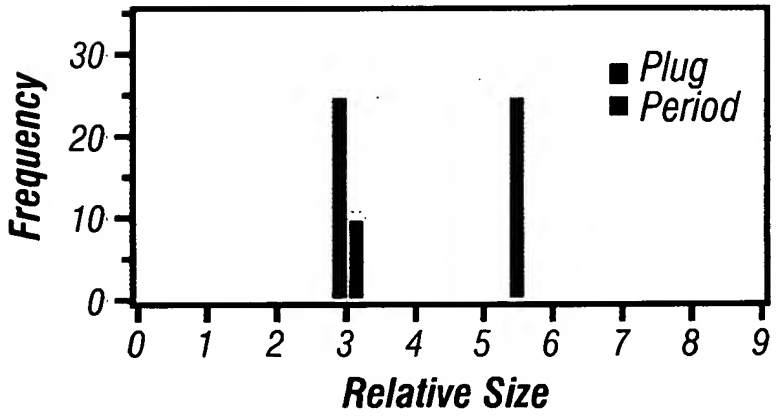


FIG. 31B

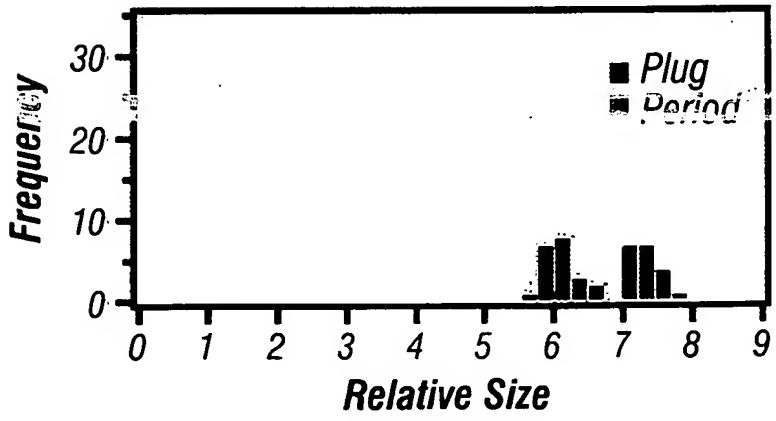


FIG. 31C

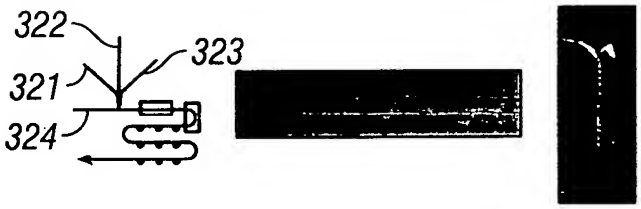


FIG. 32

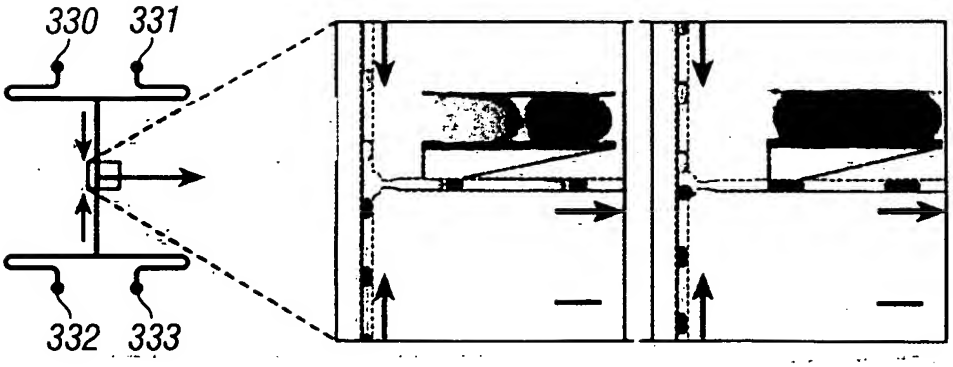


FIG. 33A

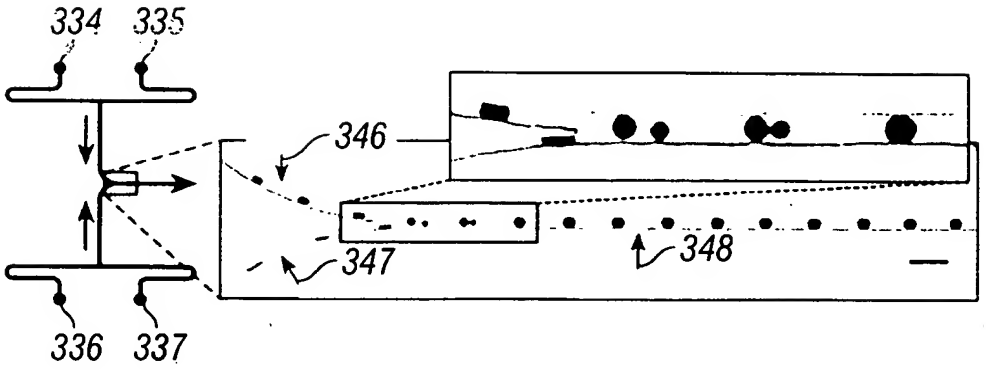


FIG. 33B

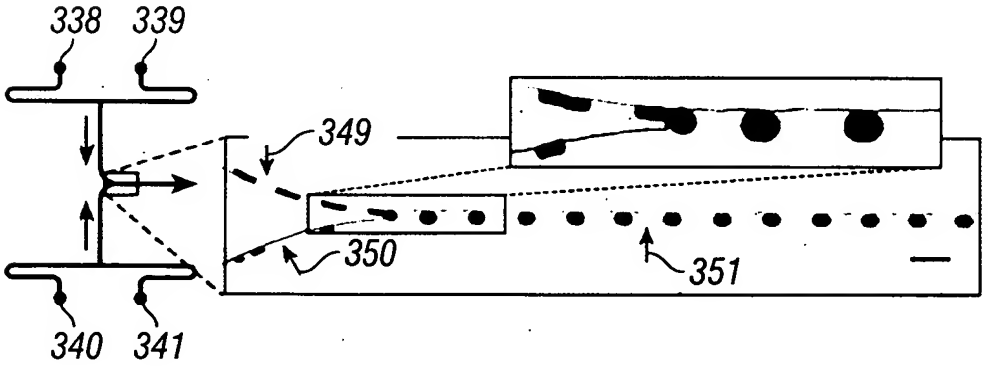


FIG. 33C

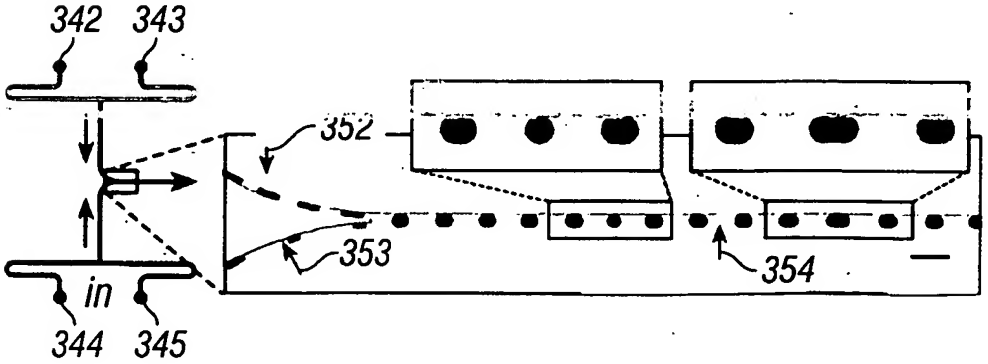


FIG. 33D

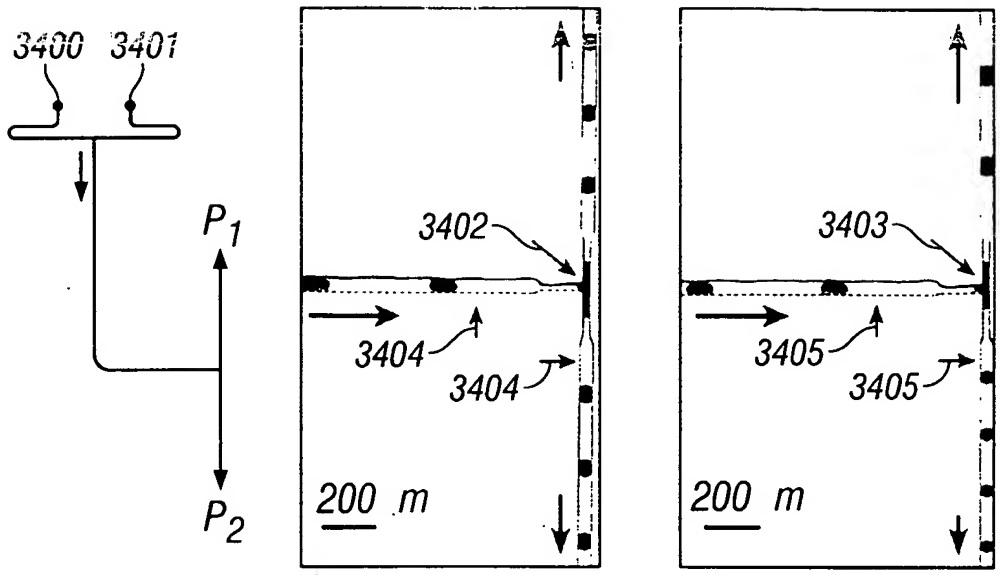


FIG. 34A FIG. 34B FIG. 34C

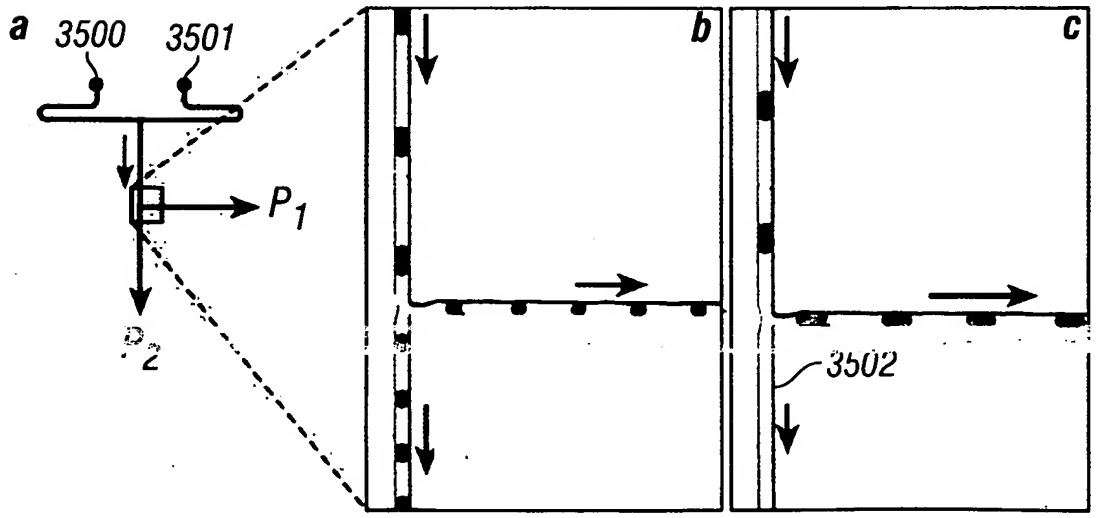


FIG. 35

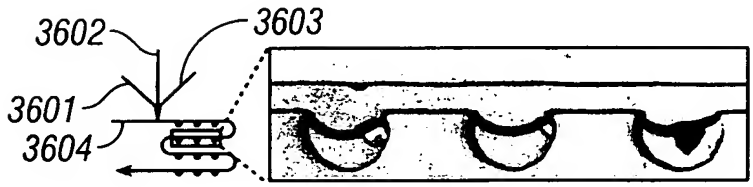

3602
3603
3601
3604

FIG. 36

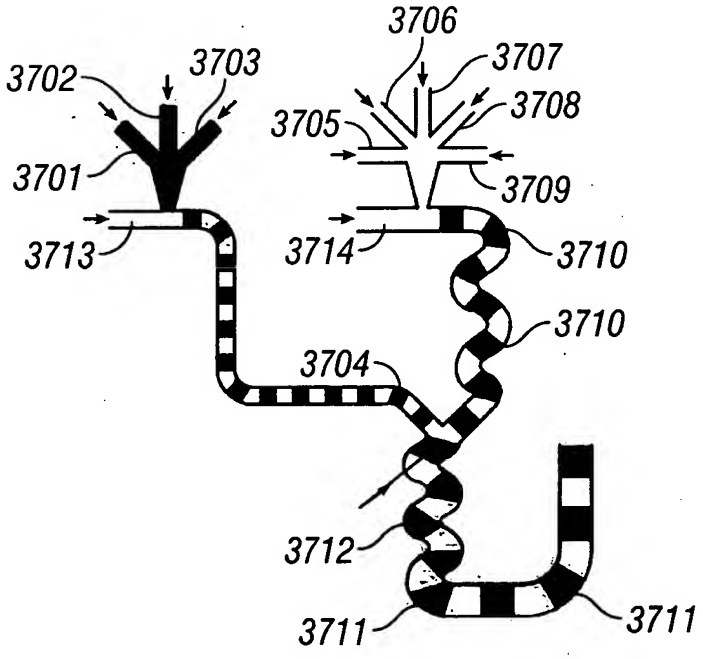

3706
3707
3702
3703
3708
3705
3701
3709
3713
3714
3710
3710
3704
3712
3711
3711

FIG. 37

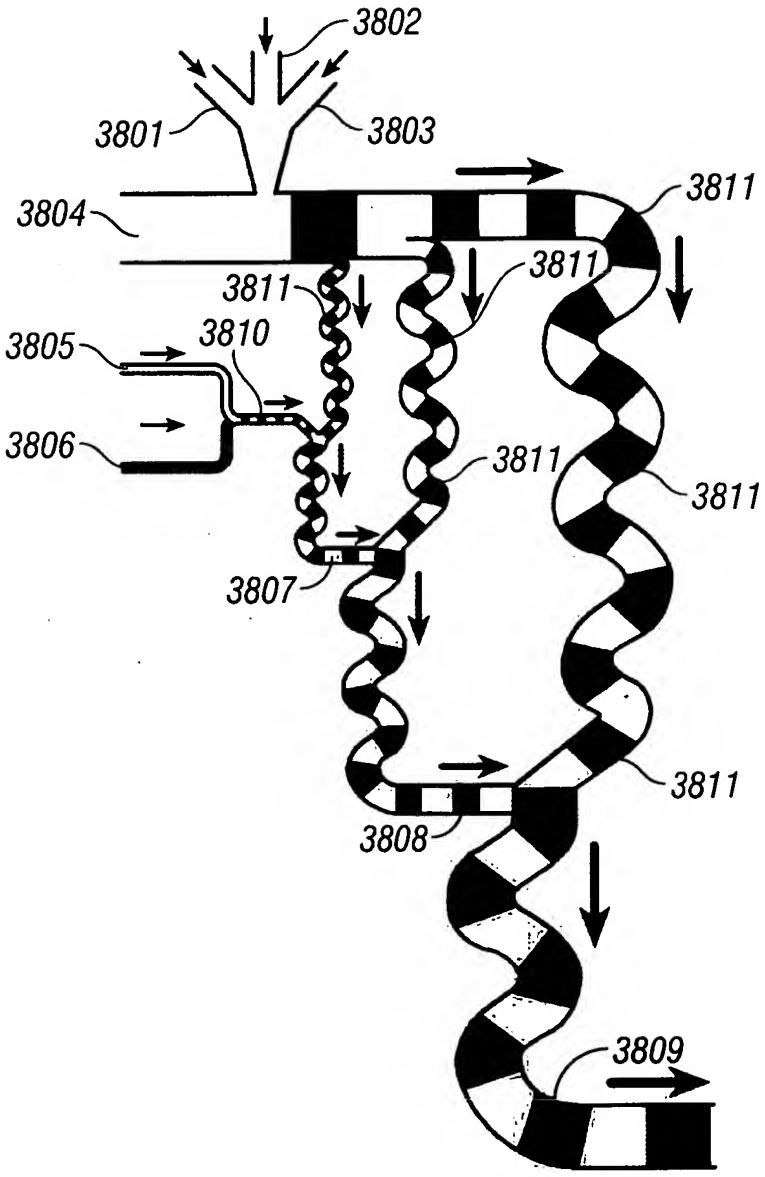

3802
3801
3803
3804
3811
3811
3811
3805
3810
3806
3811
3811
3807
3811
3808
3809

FIG. 38

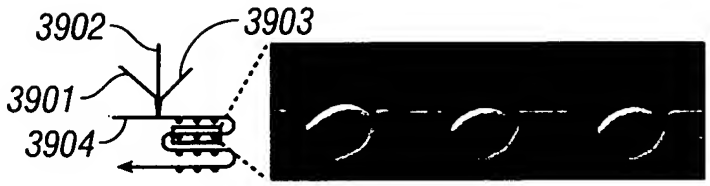

3902
3903
3901
3904

FIG. 39

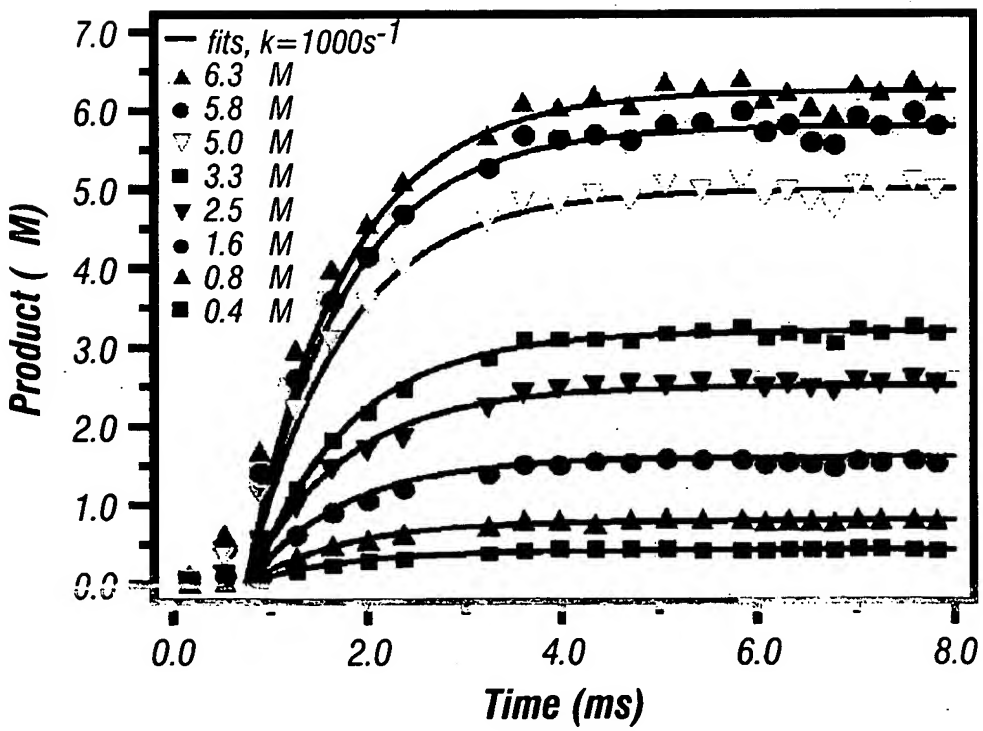

fits, k=1000s-1
6.3 M
5.8 M
5.0 M
3.3 M
2.5 M
1.6 M
0.8 M
0.4 M
Product (M)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0.0
2.0
4.0
6.0
8.0
Time (ms)

FIG. 40

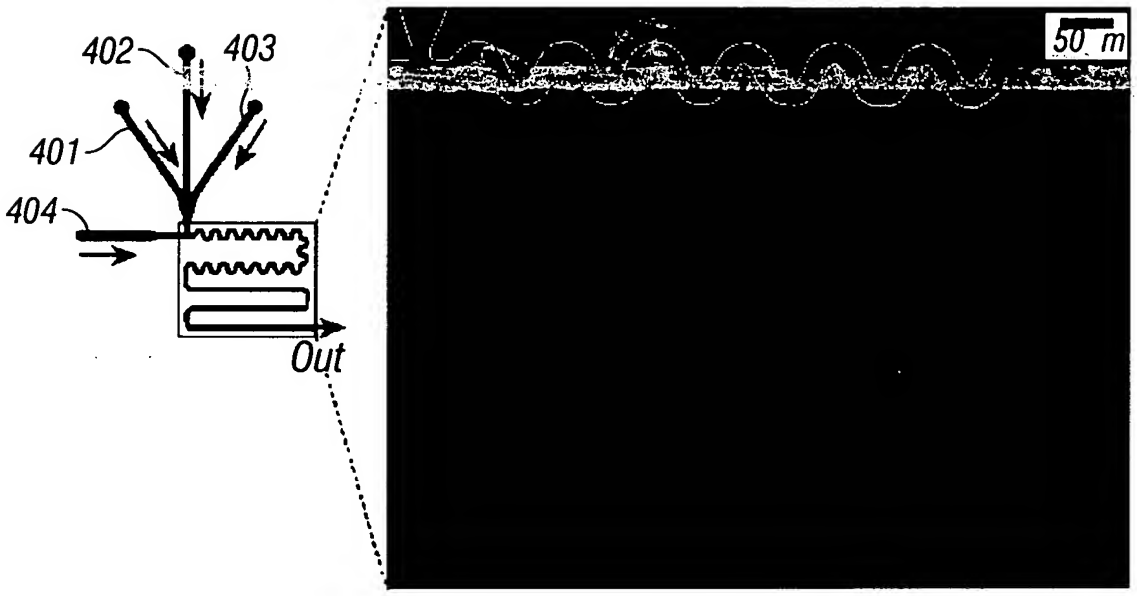


FIG. 40A

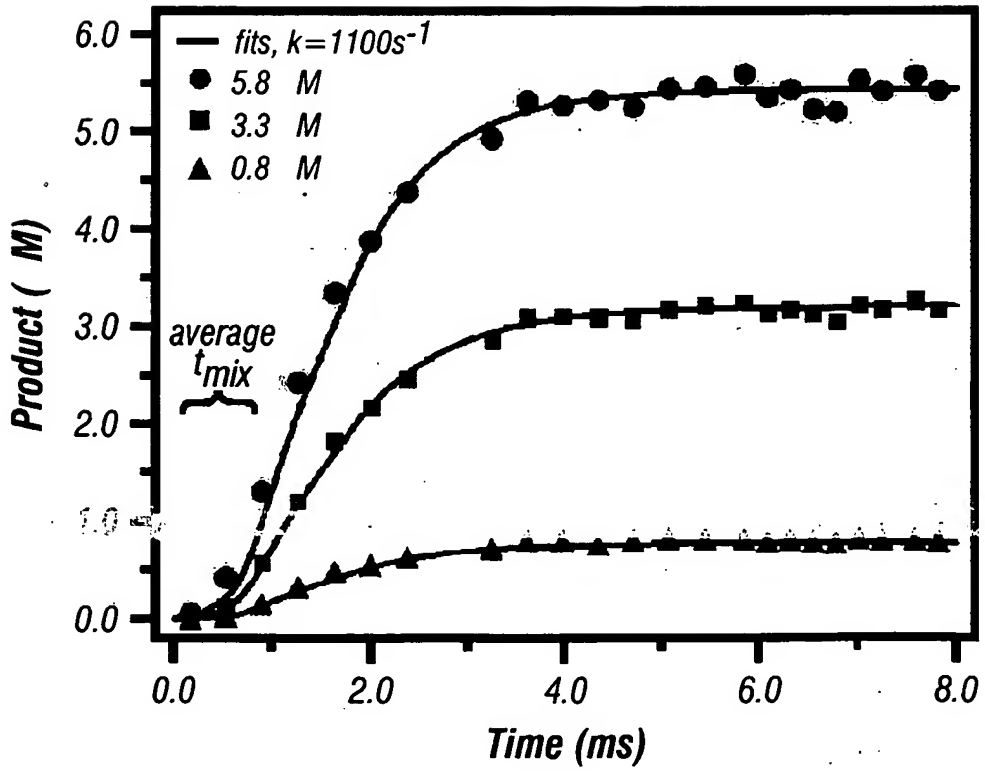


FIG. 40B

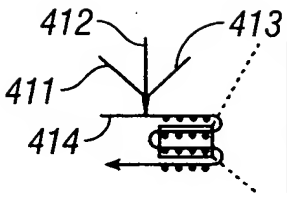


FIG. 41A

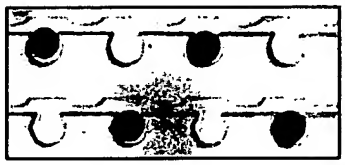


FIG. 41B

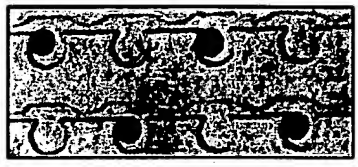


FIG. 41C

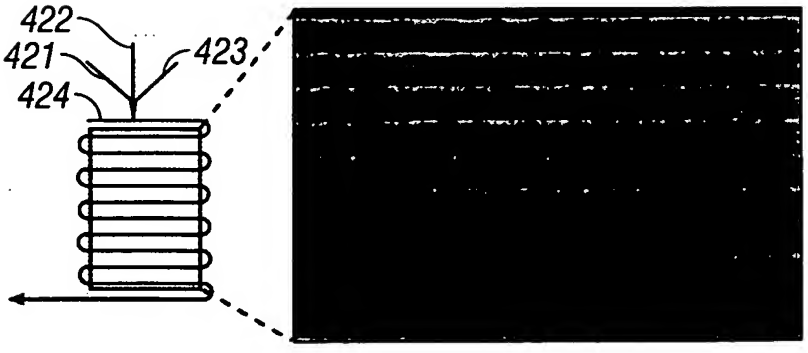


FIG. 42

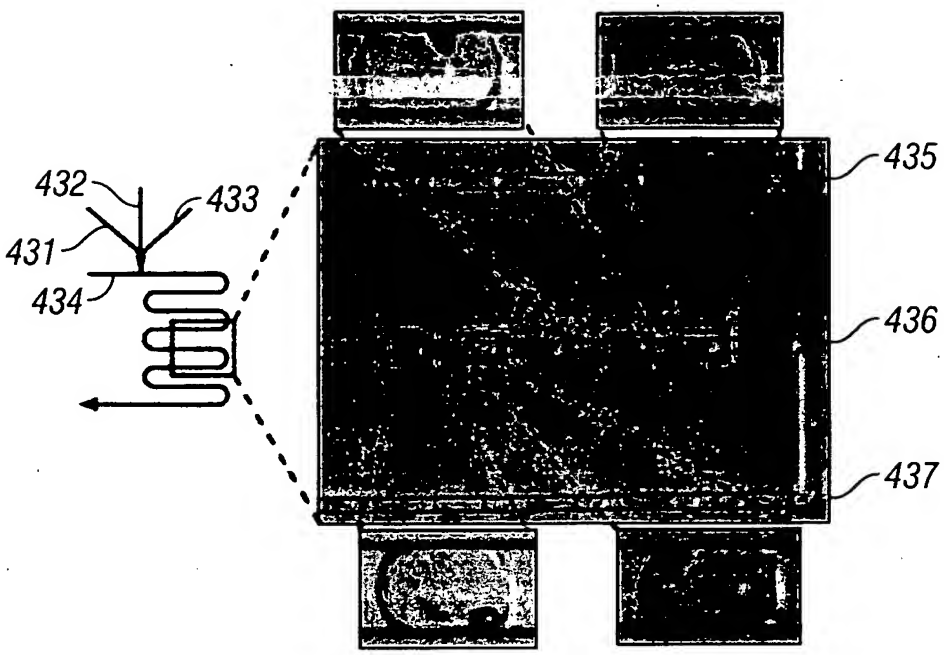


FIG. 43

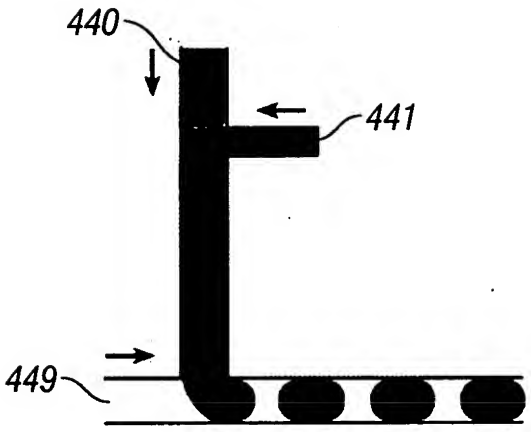


FIG. 44A

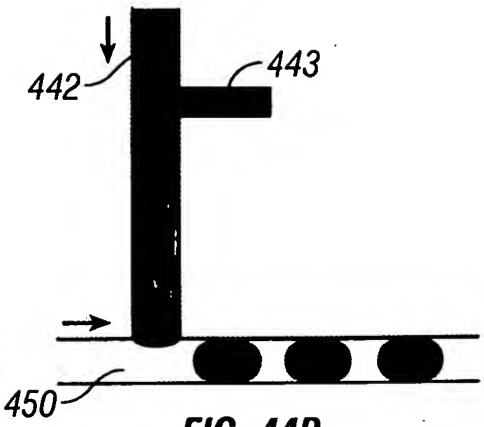


FIG. 44B

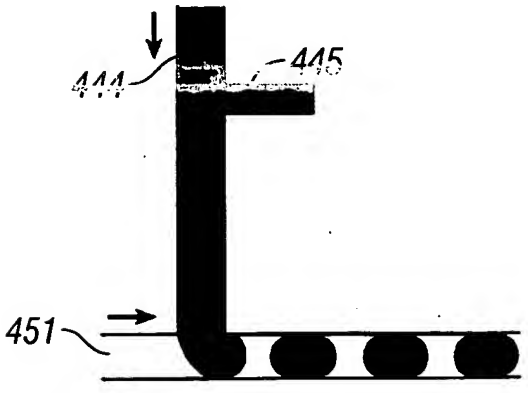


FIG. 44C

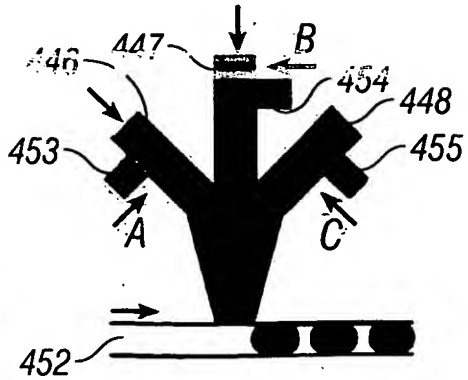


FIG. 44D

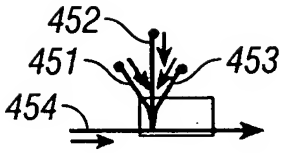


FIG. 45A

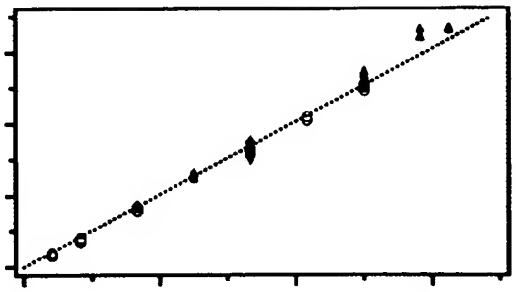


FIG. 45B

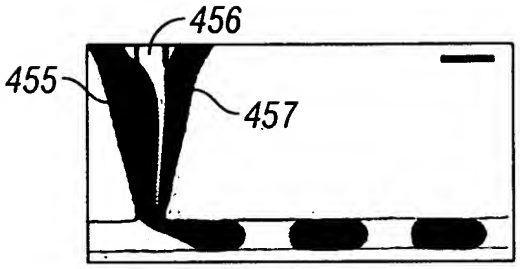


FIG. 45C

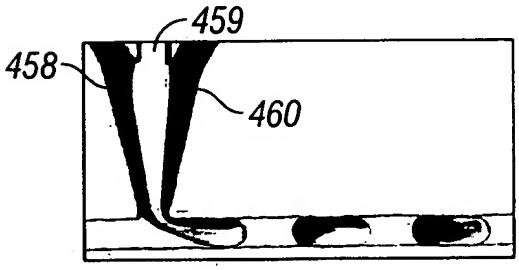


FIG. 45D

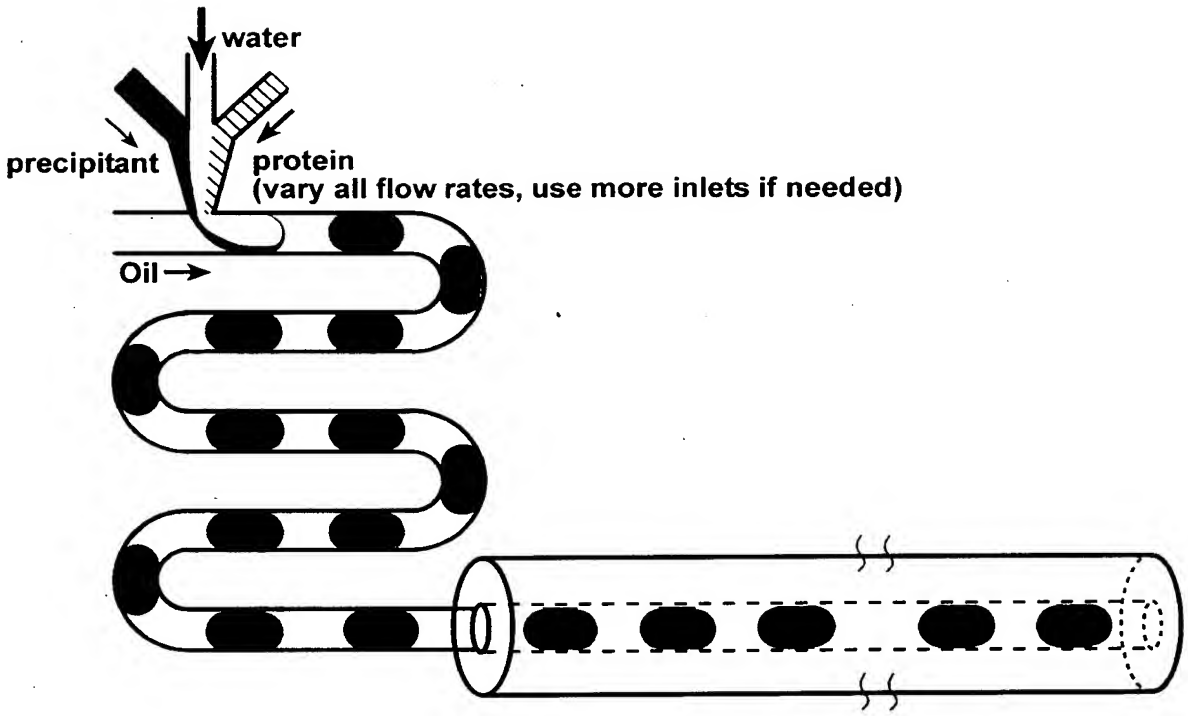

water
precipitant
protein
(vary all flow rates, use more inlets if needed)
Oil

FIGURE 46

FIGURE 47A

FIGURE 47B

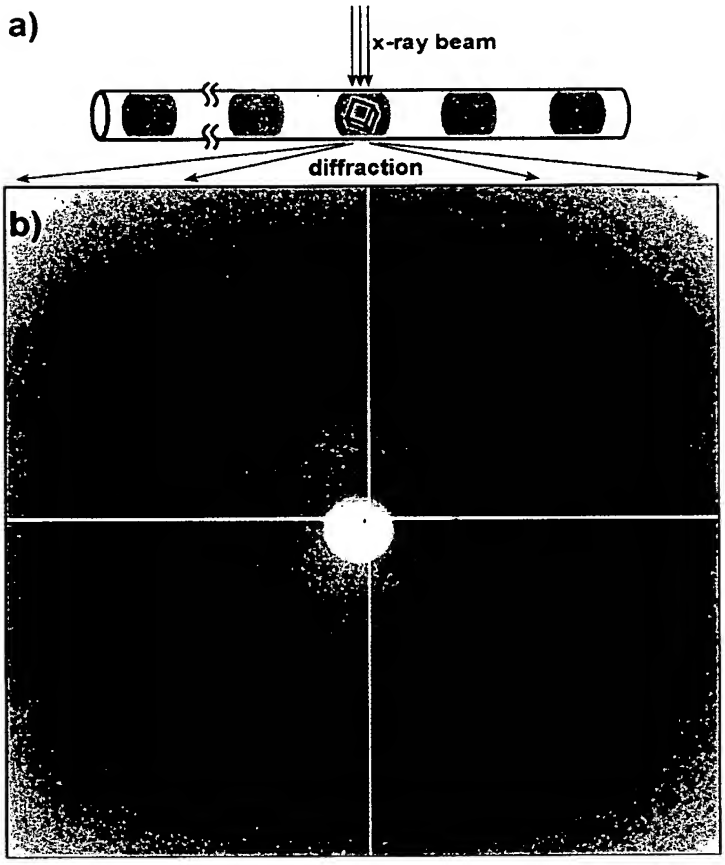


FIGURE 48

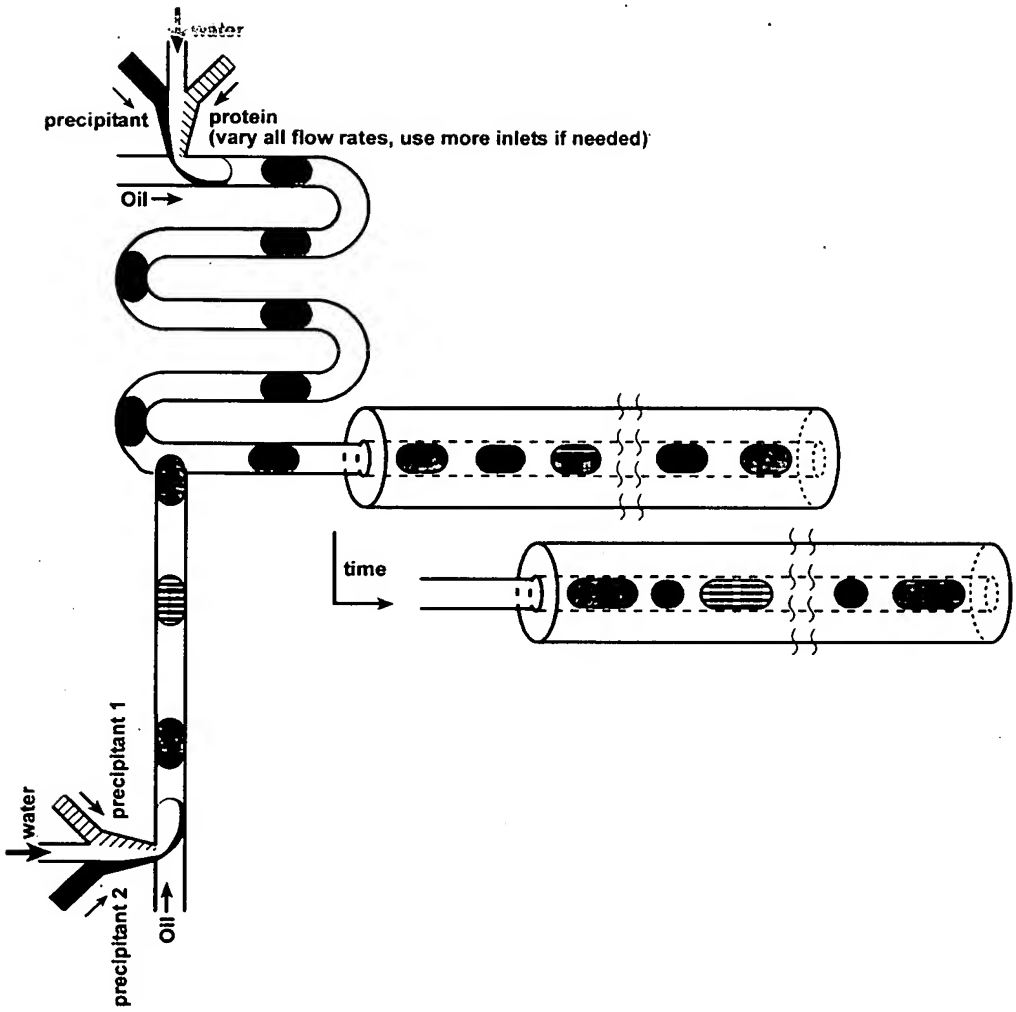

water
precipitant
protein
(vary all flow rates, use more inlets if needed)
Oil
time
water
precipitant 1
precipitant 2
Oil

FIGURE 49

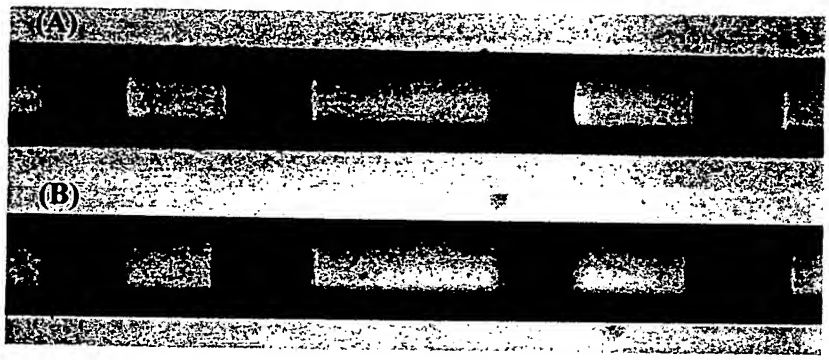


FIGURE 50

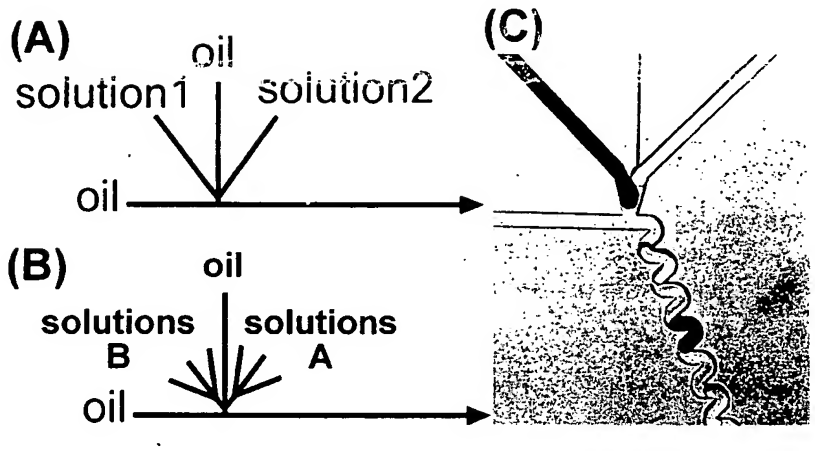

(A)
oil
solution1
solution2
oil
(B)
oil
solutions
B
solutions
A
oil
(C)

FIGURE 51

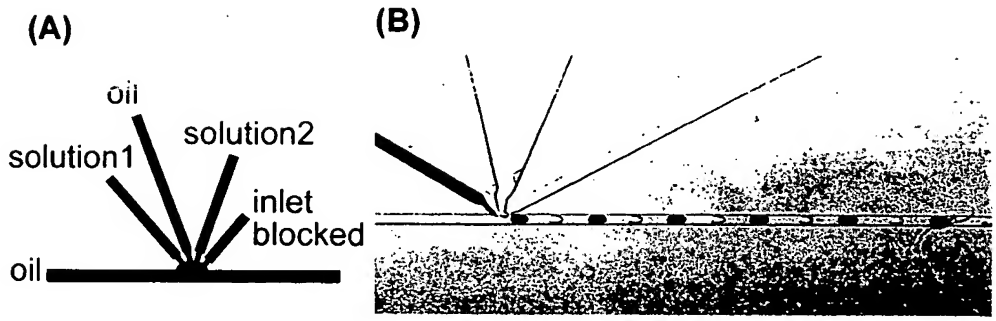


FIGURE 52

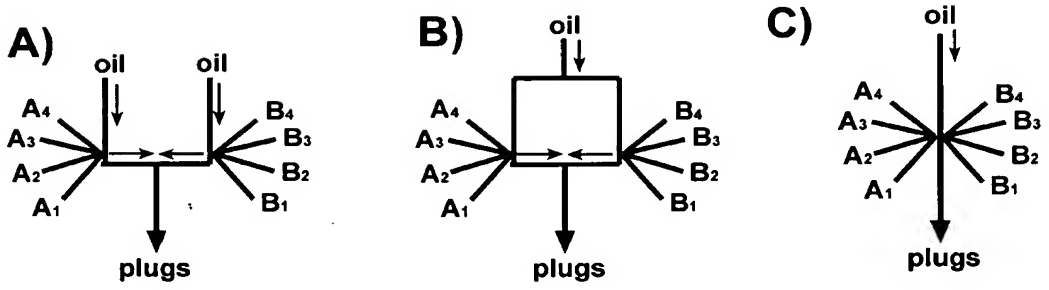

A)
oil
oil
A4
A3
A2
A1
B4
B3
B2
B1
plugs
B)
oil
A4
A3
A2
A1
B4
B3
B2
B1
plugs
C)
oil
A4
A3
A2
A1
B4
B3
B2
B1
plugs

FIGURE 53

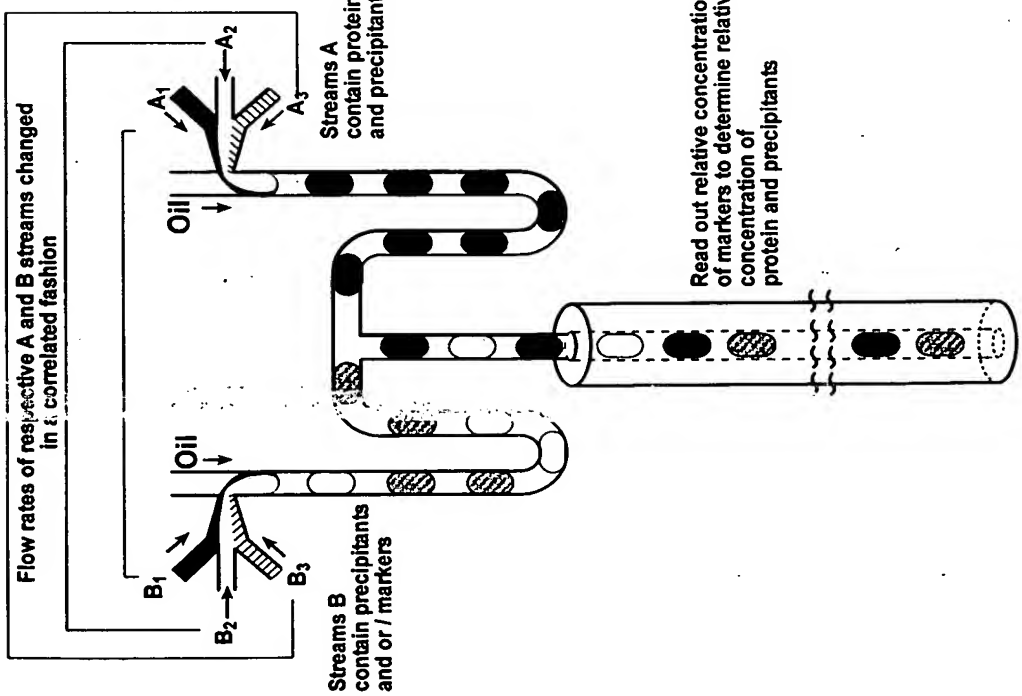


FIGURE 54A

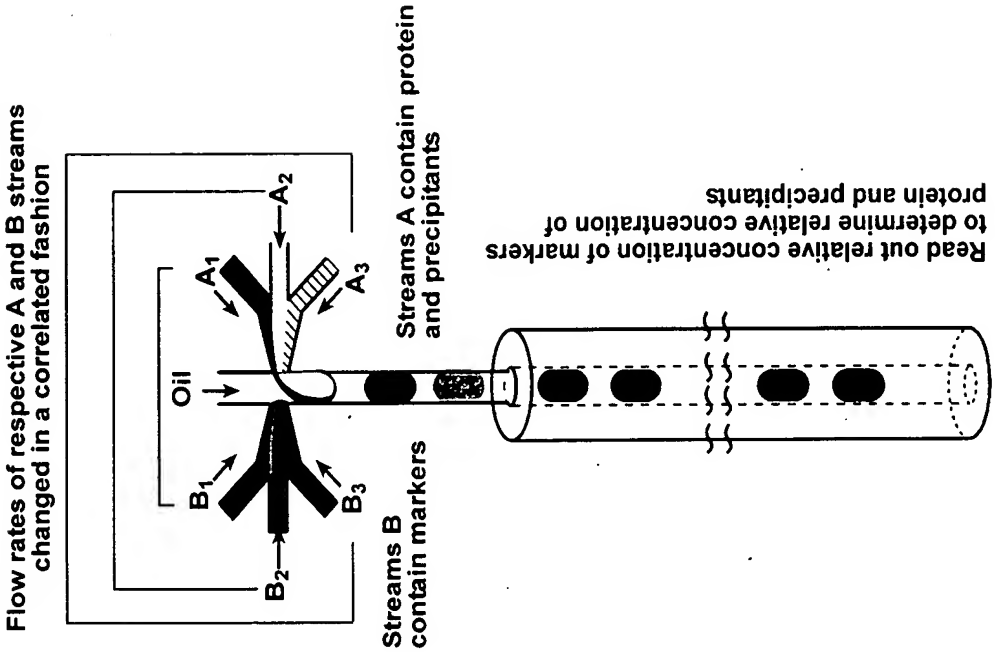
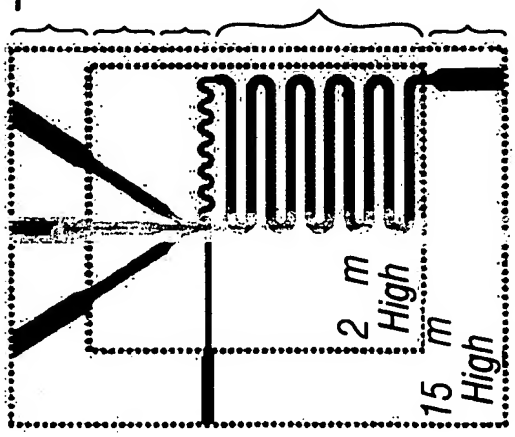


FIGURE 54B



Size of Channel (Height x Width)	P [atm]	U [m/s]	Length [m]	Time
15 m x 50 m	0.003	0.001	10000	
2 m x 5 m	0.4	0.08	200	
2 m x 1 m	0.45	0.4	10	25 s → mix
2 m x 3 m	2.0	0.13	400	3000 s = 3.0 ms → Observe
15 m x 50 m	0.003	0.001	10000	

FIG. 23